THE FAMILY STILIGERIDAE FROM JAPAN (OPISTHOBRANCHIA-SACOGLOSSA)[1]

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With Plates XXVII–XXVIII

The species of the sacoglossan family Stiligeridae previously recorded from our territory are enumerated below:

1. *Stiliger* (*Stiliger*) *berghi* BABA, 1937. Berugu-umiushi.
   Loc.: Osaka Bay; Inland Sea of Seto; Amakusa; Toyama Bay. Living on the red algae, *Ceramium*, *Polysiphonia* and *Galaxaura*.
2. *Stiliger* (*Stiliger*) *boodleae* BABA, 1938. Arimo-umiushi.
   Loc.: Sagami Bay; Okitsu, Suruga Bay; Sugashima near Toba; Kii; Osaka Bay; Inland Sea of Seto; Saeki Bay; Abashiri, Hokkaido; Sado I.; Nou, Niigata Pref.; Toyama Bay; Togi Kazanashi, W. coast of Noto Peninsula; Tsuruga Bay. Living on the green algae, *Boodlea*, *Enteromorpha* and *Ulva*.
3. *Stiliger* (*Ercolania*) *akkeshiensis* BABA, 1935. Ezo-tamamiru-umiushi.
   Loc.: Akkeshi Bay, Hokkaido.
4. *Stiliger* (*Ercolania*) *smaragdinus* BABA, 1949. Tamamiru-umiushi.
   Loc.: Sagami Bay; Toyama Bay. Living on the green alga, *Caulerpa*.
5. *Hermaea dendritica* (ALDER & HANCOCK, 1843). Midori-amamo-umiushi.
   Loc.: Tokyo Bay; Sagami Bay; Sugashima near Toba; Kii; Osaka Bay; Inland Sea of Seto; Amakusa; Sado I.; Toyama Bay; Hegura I., N. of Noto Peninsula. Living on the green algae, *Codium* and *Bryopsis*.
6. *Hermaeina*[2] (*Hermaeina*) *orientalis* BABA, 1949. Tôyô-moumiushi.
   Loc.: Sagami Bay; Okitsu, Suruga Bay.
7. *Hermaeina* (*Hermaeina*) *nigra* BABA, 1949. Kuro-moumiushi.
   Loc.: Sagami Bay; Toyama Bay.
8. *Alderia nigra* BABA, 1937. Matsumo-umiushi.
   Loc.: Amakusa.

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1) Contributions from the Seto Marine Biological Laboratory, No. 338.

2) *Aplysiopsis* DESHAYES, 1835–53=*Hermaeina* TRINCHESE, 1874. See PRUVOT-FOL, 1951, p. 69, and 1953, pp. 47–48. See also MARCUS, 1959, p. 22.

The following are here added to the list above:

1. *Stiliger* (*Stiliger*) *pusillus* BABA, n. sp. Kotsubu-moumiushi (n. n.).
2. *Stiliger* (*Stiliger*) *subviridis* BABA, n. sp. Usumidori-moumiushi (n. n.).
3. *Stiliger* (*Stiliger*) *formicarius* BABA, n. sp. Oh-arimo-umiushi (n. n.).
4. *Stiliger* (*Ercolania*) *noto* BABA, n. sp. Noto-arimo-umiushi (n. n.).
5. *Stiliger* (*Ercolania*) *zosterae* BABA, n. sp. Hana-amamo-umiushi (n. n.).
6. *Hermaea cremoniana* TRINCHESE, 1893. Tsumaguro-moumiushi (n. n.).
7. *Hermaeina* (*Hermaeina*) *minor* BABA, n. sp. Hime-kuro-moumiushi (n. n.).
8. *Hermaeina* (*Hermaeina*) *toyamana* BABA, n. sp. Toyama-moumiushi (n. n.).

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Stiliger (*Stiliger*) *pusillus* BABA, n. sp.

(Pl. XXVII, Fig. 1; Pl. XXVIII, Fig. 1)

Highly distinctive in form, in colouring, and in radula. Total length of animal 1 mm. Rhinophores very short, stout, without an outer longitudinal groove. Foot-corners rounded. Branchial papillae always 3 on each side, the first smallest, the third largest, all inflated fusiform. General ground-colour translucent whitish, with chocolate brown spots on papillae. The anterior half of the trunk is coloured with chocolate-brown. Sole whitish. Liver-diverticula in the papillae, yellowish brown. Minute dots of opaque white everywhere on back and on under side. Radula with 3 teeth in the ascending series, and 6 in the descending series. Each tooth without an indention in the middle of the back; the ventral edge of the tooth smooth.

Loc.: Tannowa, Osaka Bay, from sandy bottom (June 1957, 3 sps., coll. by Mr. HAMATANI; July 1959, 1 sp.).

The subgenus *Stiliger* is marked by a pair of simple rhinophores. Out of a dozen or more of the previously recorded members of this subgenus, *S.* (*S.*) *talis* MARCUS, 1956, from Brazil, agrees with *pusillus* in one point that the branchial papillae are only 3 in number on each side of the body. Otherwise, the two cannot be identified with each other.

Stiliger (*Stiliger*) *subviridis* BABA, n. sp.

(Pl. XXVII, Fig. 2; Pl. XXVIII, Figs. 2a–2c)

This species resembles closely *S.* (*S.*) *varians* ELIOT, 1904, from Zanzibar, in the general body-form and also in colouring. Length of animal 5 mm. Rhinophores very

long, slender, and simple (with only a trace of outer longitudinal groove near the base). Foot-corners rounded. Branchial papillae long fusiform, arranged on back-margins in about 12–13 oblique rows, at least 2 papillae in each row. Anus and nephroproct not determined. Liver-diverticula in the papillae, simple (?). Body yellowish white in ground-colour; almost everywhere it is marked by the ramification of deep green liver-diverticula shining through the transparent integument. Branchial papillae veined internally with a deep green. On the outer surface each of the papillae has a number of deep green, longitudinal lines, running towards the tip. A red marking at about the anterior end of the pericardial prominence. Sole deep green owing to the liver ramification. Radula with 3 teeth in the ascending series, 6 teeth in the descending series, and a heap of these in the ascus. Each tooth deeply indented in the middle of the back and smooth at the ventral edge. In the general shape of the radula teeth, *subviridis* does not agree exactly with *varians*.

Loc.: Abugashima, Toyama Bay, on a green alga (July 1951, 1 sp., coll. by Mr. ABE).

This is tentatively separated from *varians*, and is regarded as a new species.

Stiliger (*Stiliger*) *formicarius* BABA, n. sp.

(Pl. XXVII, Figs. 3a–3b; Pl. XXVIII, Figs. 3a–3b)

The present form comes nearest to our common species, *S.* (*S.*) *boodleae* BABA, 1938, in the general body-form and in colours, but it may easily be distinguished from the latter as follows:

S. boodleae	*S. formicarius*
1. Body small, usually 4–5 (at most 7–8) mm long.	1. Rather large, 7–10 mm.
2. Pericardial prominence ovate.	2. Exceedingly elongated behind.
3. Anus in the posterior half of the pericardial prominence.	3. At the right anterior corner of the pericardial prominence.
4. Foot-corners rounded.	4. Produced and tentaculiform.
5. Branchial papillae tipped with brown.	5. Tipped with white.

Animal rather large, 7–10 mm long, just like a black ant in appearance. Rhinophores simple (with a trace of outer longitudinal groove near the base). Foot-corners unusually produced to form long-pointed tentacles. Fusiform branchial papillae arranged in 5–7 oblique rows on back-margins, each row containing from 3 to 4 papillae. Liver-diverticula ramified in the papillae. Pericardial prominence markedly elongate-oval, extending from behind the base of the rhinophores to about the middle of the back. Anus situated at the right anterior corner of the pericardial prominence; nephroproct closely inside the anus. Genital orifice situated roughly as in *boodleae*.

General body-colour black. Almost all of the specimens have a white patch on the top of the head, between the two rhinophores. Branchial papillae always tipped with white. Sole colourless. Radula teeth 7–8 in the ascending series, and 20–25 in the descending series (Amakusa specimens); 8 in the ascending series, and about 27 in the descending series (Niigata specimen). Each tooth without an indention in the middle of the back; the ventral edge of the tooth smooth. In the shape of the radula teeth, *formicarius* differs greatly from *boodleae*.

Loc.: Tomioka, Amakusa, living on a green alga in the intertidal zone (Feb. 1940, many sps.). Nou, Niigata Pref. (July 1958, 1 sp., coll. by Mr. ABE).

Stiliger (*Ercolania*) *noto* BABA, n. sp.

(Pl. XXVII, Figs. 4a–4b; Pl. XXVIII, Figs. 4a–4b)

This species resembles closely *S.* (*S.*) *boodleae* BABA, 1938, in the black colouring of the body, but the two may be separated from each other as follows:

S. boodleae	*S. noto*
1. Rhinophores simple.	1. Auriculate.
2. Descending series of radula not spiral.	2. Spiral.
3. Radula teeth indented in the middle of the back.	3. Not indented.

Animal 5–10 mm in length. With a pair of lobiform oral tentacles. Rhinophores auriculate, having an outer longitudinal groove. Branchial papillae long fusiform. They are arranged on back-margins in 9–10 oblique rows with 1–2 papillae in each row. Liver-diverticula ramified in the papillae, but no branching of the albumen gland in these structures. Pericardial prominence ovate; anus and nephroproct not determined. General aspect of the animal black. Head especially marked by having 4 longitudinal bands of intense black; the median part of the head and the eye-regions white. Back black. It is somewhat deeper towards the outer edges of the mantle and in the median line behind the pericardial prominence. Upper half of the oral tentacles and of the rhinophores opaque white. The pericardial region also opaque white. The branchial papillae black, the inner and the outer edges towards the end opaque white, their tips yellowish brown; the inner veins of the papillae dark yellow. Sole yellowish white. Radula teeth 10 in the ascending series, and about 38 in the descending spiral series. Each tooth without an indention in the back; the ventral edge smooth (?).

Loc.: Usetsu, Toyama Bay (July 1953, 2 sps., coll. by Mr. ABE). Hegura I., N. of Noto Peninsula (Aug. 1957, 2 sps., coll. by Mr. ABE). Togi Kazanashi, W. coast of Noto Peninsula (Aug. 1957, 2 sps., coll. by Mr. ABE).

The subgenus *Ercolania* differs from *Stiliger* s. s. in the auriculate rhinophores. About 8 species of *Ercolania* have hitherto been recorded from the world, none of which coincides with our species, *noto*, in colours.

Stiliger (Ercolania) zosterae BABA, n. sp.

(Pl. XXVII, Fig. 5; Pl. XXVIII, Figs. 5a–5b)

Very small, about 3 mm in length. Rhinophores auriculate. Branchial papillae short fusiform, arranged in a single row of 6–7 on each side, very irregular in size. Foot-corners rounded. General ground-colour of the animal whitish. Head above marked with a purple-red U-letter, the legs running up into the lower halves of the rhinophores. There is an additional purple-red band on each side of the neck; it is divided into two interrupted stripes which pass down the body to near the tip of the tail. Branchial papillae veined with light olive-green, their tips chrome-yellow, their surface ornamented with 3 longitudinal stripes of purple-red. Rhinophores tipped with opaque white. Radula teeth 6 in the ascending series, and about 13 in the descending series. Each tooth straight on the back, and smooth on the ventral edge.

Loc.: Tomioka, Amakusa, living on *Zostera marina* (Dec. 1936, 1 sp.).

This species is unmistakable in colours in the subgenus *Ercolania*.

Hermaea cremoniana TRINCHESE, 1893

(Pl. XXVII, Figs. 6a–6b; Pl. XXVIII, Figs. 6a–6d)

Hermaea cremoniana TRINCHESE, 1893, pp. 154–155.—Naples; TRINCHESE, 1896, pp. 35–45, 2 pls.

Total length of animal 5–15 mm. Rhinophores auriculate. Branchial papillae fusiform and very long; they are arranged on back-margins in 15–20 oblique rows, with 4–5 papillae in each row. Within each of these papillae there appears a simple liver-diverticulum, which, in turn, is often accompanied by convoluted canals of the albumen gland (see the characterization of the genus *Hermaea* by MACNAE, 1954, p. 59). Pericardial prominence elongate-oval; anus and nephroproct not determined. Foot-corners rounded. Colouring distinctive and quite unmistakable. The whole animal including the sole, deep orange-yellow in ground-colour. Head and rhinophores black; eye-regions white; median part of back and sides of body, black; branchial papillae orange-yellow below, black above. Radula teeth 11 in the ascending series, and about 18 in the descending series; all of them smooth on the ventral edge.

Loc.: Seto, Kii, in tide pools (Sept. 1957, 4 sps., coll. by Mr. HAMATANI). Abugashima, Toyama Bay (Aug. 1954, 4 sps., coll. by Mr. ABE). Hegura I., N. of Noto Peninsula (Aug. 1957, 1 sp., coll. by Mr. ABE).

At present, a little more than 10 species are known of the genus *Hermaea*. Our specimens are here referred to *cremoniana* from Naples mainly by colours and by the type of the radula.

Hermaeina (*Hermaeina*) *minor* BABA, n. sp.

(Pl. XXVII, Fig. 7; Pl. XXVIII, Figs. 7a–7c)

Animal black-coloured as in *H.* (*H.*) *nigra* BABA, 1949. Total length 7–10 mm. Rhinophores auriculate. Oral tentacles lobiform. Branchial papillae rounded in section, smooth on the surface, having no dendritic veins as seen in *nigra*; they are arranged on back-margins in 7 oblique rows, with about 2 papillae in each row. Liver-diverticula branching within the papillae (?). Anus closely in front of the ovate pericardial prominence, within which opens a nephroproct. Foot-corners rounded. Body black above; the branchial papillae also black to the tip; the sole yellowish white with two longitudinal black bands. A white patch around the eye on each side; it runs up to the tip of the rhinophore. Radula as formal in the genus *Hermaeina*: about 6 teeth in the ascending series, and 32 teeth in the descending spiral series; each tooth with a deep indention in the middle of the back; the ventral edge of the tooth finely denticulated.

Loc.: Amaharashi, Toyama Bay (Jan. and May 1957, 7 sps., coll. by Mr. ABE).

The genus *Hermaeina* differs from *Hermaea* in that the descending series of the radula is coiled spirally. Each tooth has an indention on the back, and a series of denticulations on the ventral edge. The branching of the albumen gland does not pass into the branchial papillae. Six species of *Hermaeina* have hitherto been recorded. The new species, *minor*, appears to be closely allied to *nigra* in the black colouring, but it is separated from the latter as follows:

H. nigra	*H. minor*
1. Body up to 30 mm long.	1. Smaller, 7–10 mm.
2. Branchial papillae rather thickly-set, in about 25 oblique rows.	2. Not so thickly-set, only in about 7 oblique rows.
3. Branchial papillae with weak branching veins on the inner surface.	3. Smooth, no veins on surface.
4. Sole uniformly dark.	4. With two longitudinal black bands.

Hermaeina (*Hermaeina*) *toyamana* BABA, n. sp.

(Pl. XXVII, Figs. 8a–8d; Pl. XXVIII, Figs. 8a–8c)

This is closely allied to *H.* (*H.*) *orientalis* BABA, 1949 in the general aspect. Animal 7 mm long, rhinophores auriculate, oral tentacles lobiform, foot-corners rounded. Branchial papillae arranged on back-margins in about 13 oblique rows, 2–3 papillae in each row. The ridge-like veins on the inner surface of the papillae weak and not so thickly branching as in *orientalis*. Body yellowish white in ground-colour. A median black band on head (not a brown band as in *orientalis*); it passes in front along the anterior margin of the rhinophores. Posteriorly the band becomes

rather ill-defined, but still it extends down the back. Branchial papillae grass-green with black tips. On the outer surface each of the papillae is often marked by a pair of brown bands which run down obliquely from the tip. An additional opaque-white line medianly on the outer surface; the branching veins on the inner surface of the papillae opaque white. Rhinophores with a longitudinal opaque white line. Sole yellowish white, and with two longitudinal black bands (not brown bands as in *orientalis*). The type of the radula approximately as in *orientalis*: about 7 teeth in the ascending series, and 35 teeth in the descending spiral series; each tooth with an indention on the back and a series of denticles on the ventral edge.

Loc.: Abugashima, Toyama Bay, on a green alga (July 1952, 1 sp., coll. by Mr. ABE). Amaharashi, Toyama Bay (June and July 1958, 7 sps., coll. by Mr. ABE). Mera, Fukui Pref., on a green alga, *Cladophora* (July 1959, 2 sps., coll. by Mr. ABE).

The present form is tentatively separated from *orientalis* by the weak veins on the inner surface of the papillae, and by the detail of the body-colours.

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EXPLANATION OF PLATES XXVII–XXVIII

PLATE XXVII

Fig. 1. *Stiliger* (*Stiliger*) *pusillus* (Tannowa, Osaka Bay, June 30, 1957, length 1 mm).

Fig. 2. *Stiliger* (*Stiliger*) *subviridis* (Abugashima, Toyama Bay, July 24, 1951, length 5 mm).

Figs. 3a–3b. *Stiliger* (*Stiliger*) *formicarius* (Tomioka, Amakusa, Feb. 24, 1940, length 10 mm). 3a. Animal; 3b. A branchial papilla.

Figs. 4a–4b. *Stiliger* (*Ercolania*) *noto* (Togi Kazanashi, W. coast of Noto Peninsula, Aug. 4, 1957, length 5 mm). 4a. Animal; 4b. A branchial papilla.

Fig. 5. *Stiliger* (*Ercolania*) *zosterae* (Tomioka, Amakusa, Dec. 20, 1936, length 3 mm).

Figs. 6a–6b. *Hermaea cremoniana* (Seto, Kii, Sept. 22, 1957, length 5 mm). 6a. Animal; 6b. A branchial papilla; the liver-diverticulum is seen accompanied by convoluted canals of the albumen gland.

Fig. 7. *Hermaeina* (*Hermaeina*) *minor* (Amaharashi, Toyama Bay, Jan. 26, 1957, length 10 mm, original fig. by Mr. ABE).

Figs. 8a–8d. *Hermaeina* (*Hermaeina*) *toyamana* (Abugashima, Toyama Bay, July 21, 1952, length 7 mm). 8a. Animal; 8b. A branchial papilla on the inner surface; 8c. The same on the outer surface; 8d. The same with a branching liver-diverticulum.

PLATE XXVIII

Fig. 1. *Stiliger* (*Stiliger*) *pusillus*.
Radula teeth (×650).

Figs. 2a–2c. *Stiliger* (*Stiliger*) *subviridis*.
2a. Under side of head and foot; 2b. Radula teeth (×20); 2c. A tooth (×200).

Figs. 3a–3b. *Stiliger* (*Stiliger*) *formicarius*.
3a. Radula teeth (×170); 3b. A tooth (×330).

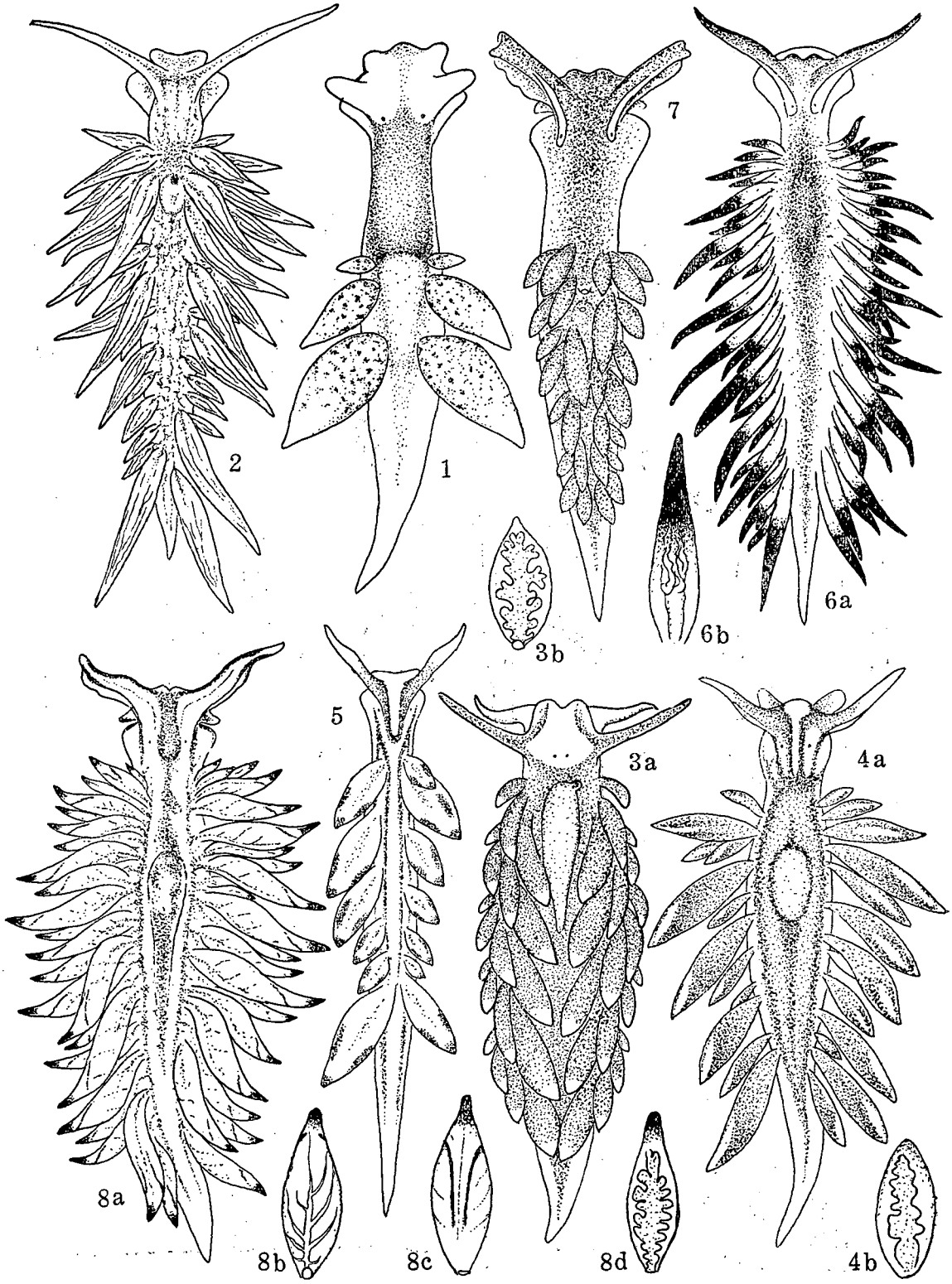
Figs. 4a–4b. *Stiliger* (*Ercolania*) *noto*.
4a. Radula teeth (×190); 4b. A tooth (×350).

Figs. 5a–5b. *Stiliger* (*Ercolania*) *zosterae*.
5a. Radula teeth (×300); 5b. A tooth (×520).

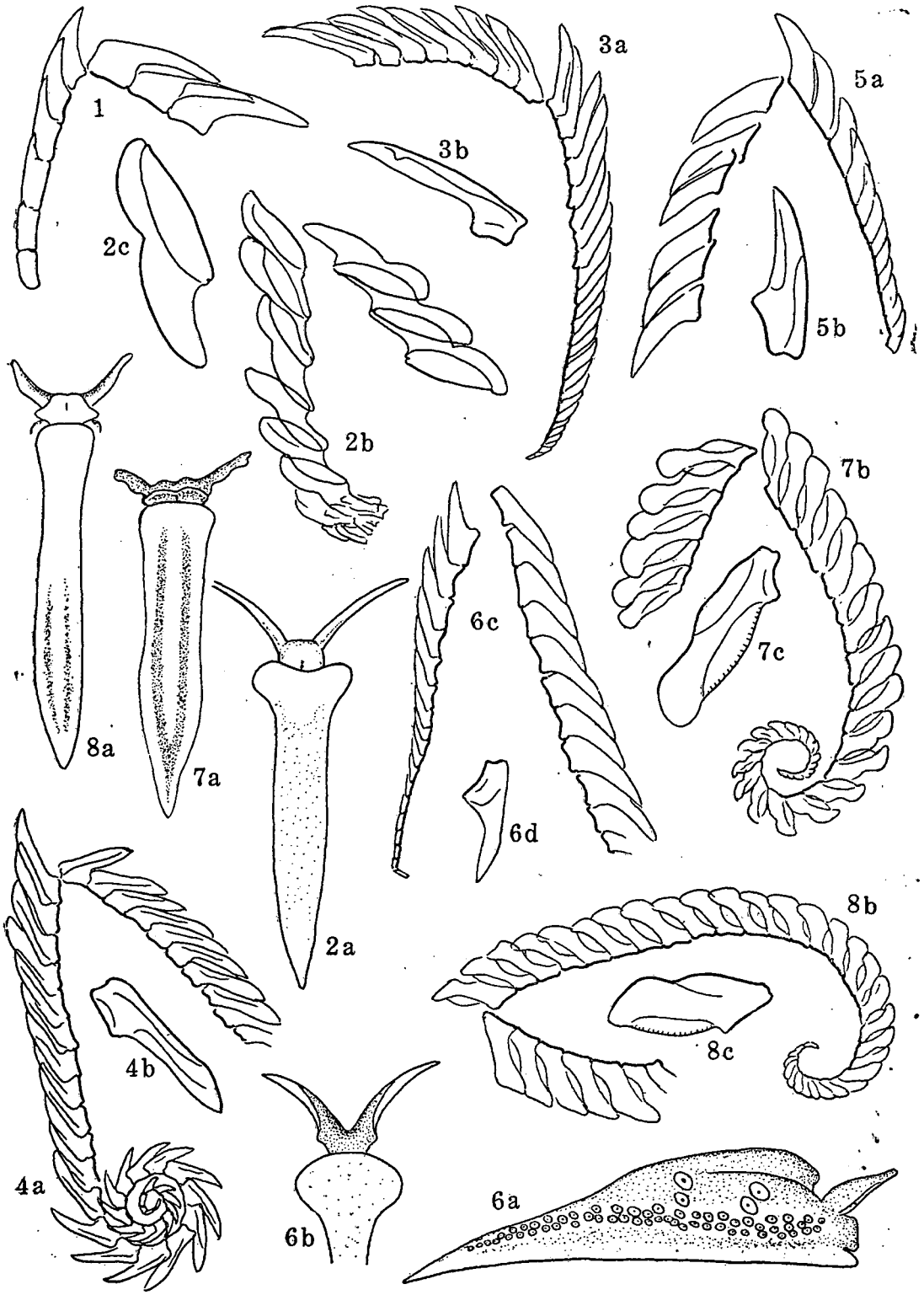
Figs. 6a–6d. *Hermaea cremoniana*.
6a. Right side of animal; 6b. Under side of head and foot; 6c. Radula teeth (×260); 6d. A tooth (×450).

Figs. 7a–7c. *Hermaeina* (*Hermaeina*) *minor*.
7a. Under side of head and foot; 7b. Radula teeth (×90); 7c. A tooth (×170).

Figs. 8a–8c. *Hermaeina* (*Hermaeina*) *toyamana*.
8a. Under side of head and foot; 8b. Radula teeth (×90); 8c. A tooth (×150).



K. Baba: The Family Stiligeridae from Japan.



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